PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canáda for December, 1887, as determined from the reports of about eight hundred stations, is exhibited on chart iv. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departures from the normal. The figures opposite the names of the geographical districts in columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal, and subtracting when above.

In all districts east of the one hundredth meridian, with the exception of the lower lake region, Ohio Valley, and New England, the rainfall of December, 1887, was above the normal, the excess being greatest in the Gulf States and lower Rio Grande valley, where the rainfall amounted to from 2 to 3 inches above the normal, the percentage of excess being about 40 per cent. for the east Gulf states, 75 per cent. for the west Gulf states, and about 300 per cent. for the lower Rio Grande valley. A marked excess of rainfall, amounting to about 33 per cent. more than the average, also occurred in the middle and south Atlantic states, and in the Florida Peninsula.

In the lower lake region the deficiency amounts to about 15 per cent. of the average; in the Ohio Valley and Tennessee, about 5 per cent.; the rainfall for New England was normal.

The heaviest rainfalls reported during the month occurred on the north Pacific coast, more than 20 inches having fallen at Neah Bay, Wash., while several stations in that region report from 15 to 17 inches. These heavy rains, however, exceed the average for that region by only about 45 per cent.

Throughout California the rainfall was much below the average; in the northern part of the state but little more than half of the average amount of rain fell, and in the southern part of the state it amounted to about 70 per cent.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for December, 1887; (4) the departures of the current month from the average; (5) and the extreme monthly precipitation for December during the period of observations and the year of occurrence:

State and station.	County.	(1) Average for the month of Dec.	(2) Length of record.	(3) Total for December, 1887.	(4) Departure from average.	(5) Extreme monthly precipitation for December.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	4.24	6	3.69	—0.55	11.37	1884	1.51	1886
California.									
Fall Brook	San Diego	2.51	11	3.56	+1.05	7.15	1884	0.08	1876
Sacramento	Sacramento	4.52	22	2.89	—1.63	11.56	1880	0.00	1876
Connecticut.									
Canton	Hartford	3.68	26	4.97	+1.29				
Hartford	Hartford	3.78	16	5.88	+2.10				
Middletown	Middlesex	3.78	29	4.86	+1.08				
Wallingford	New Haven	4.21	29	5.18	+0.97				
Illinois.									
Greenville	Bond	4.21	10	4.68	+0.47				
Peoria	Peoria	2.41	32	3.65	+1.24				
Prairieville	Lee	3.93	7	9.02	+5.09				
Rockford	Winnebago	2.22	15	5.01	+2.79				
Riley	McHenry	1.97	27	3.31	+1.34				
Indiana.									
Logansport	Cass	2.64	33	3.80	+1.16	5.99	1881	0.00	1876
Spiceland	Henry	2.90	28	4.16	+1.26	6.50	1884	1.20	1861
Vevay	Switzerland	4.12	21	3.29	—0.83	7.60	1879	1.20	1876
Iowa.									
Cresco	Howard	1.29	14	2.58	+1.29				
Kansas.									
Independence	Montgomery	2.23	15	1.86	—0.37	5.17	1879	0.65	1886
Lawrence	Douglas	1.59	20	2.08	+0.49	4.39	1873	0.43	'76 '80
Wellington	Sunman	1.07	9	0.83	—0.24	3.14	1884	0.08	1886

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of Dec.	(2) Length of record.	(3) Total for December, 1887.	(4) Departure from average.	(5) Extreme monthly precipitation for December.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Maine.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Cornish	York	4.42	30	2.88	—1.54				
Gardiner	Kennebec	3.82	49	5.61	+1.79	7.55	1878	0.83	1875
Lewiston	Androscoggin	4.50	13	5.73	+1.23				
Orono	Penobscot	4.02	19	4.72	+0.70				
Maryland.									
Cumberland	Alleghany	2.26	16	3.00	+0.74	4.50	1881	0.80	1877
Fallston	Harford	3.56	17	6.40	+2.84	7.02	1878	1.27	1873
McDonogh	Baltimore	3.04	10	2.85	—0.19	4.34	1880	1.16	1882
Massachusetts.									
Amherst	Hampshire	3.55	53	3.47	—0.08				
Cambridge	Middlesex	3.71	47	3.71	0.00				
Lake Cochituate	Middlesex	3.52	36	3.80	+0.28				
Ludlow	Hampden	3.25	12	4.31	+1.06				
Mystic Lake	Middlesex	3.07	12	3.72	+0.65				
New Bedford	Bristol	4.12	75	4.28	+0.16				
Springfield	Hamden	3.52	40	3.81	+0.29				
Waltham	Middlesex	2.97	62	4.13	+1.16				
Nevada.									
Carson City	Ormsby	2.01	9	2.08	+0.07	4.75	1884	0.00	1876
New Brunswick.									
Saint Johns	Saint Johns	4.74	27	6.48	+1.74				
New Hampshire.									
Antrim	Hillsborough	4.13	9	4.01	—0.12	6.60	1881	2.45	1882
Concord	Merrimac	2.81	32	3.62	+0.81				
Hanover	Grafton	2.14	22	3.45	+1.31				
New Jersey.									
Dover	Morris	3.55	5	6.78	+3.23				
New York.									
Boyd's Corners	Putnam	3.78	21	6.71	+2.93				
Factoryville	Tioga	1.50	6	2.00	+0.50	2.73	1884	0.77	1886
Humphrey	Cattaraugus	3.08	4	2.60	—0.48	3.69	1884	2.60	1887
Palermo	Oswego	3.94	34	2.45	—1.49	7.95	1878	1.60	1874
Ohio.									
Wauseon	Fulton	2.37	15	2.69	+0.32	4.32	1879	0.41	1874
Yellow Springs	Greene	2.53	3	3.31	+0.78	3.31	1887	1.59	1885
Pennsylvania.									
Corry	Erie	2.80	3	2.19	—0.61	2.91	1886	2.19	1887
Dyberry	Wayne	2.63	19	4.19	+1.56				
Rhode Island.									
Providence	Providence	3.95	56	4.20	+0.25				
South Carolina.									
Stateburg	Sumter	3.40	7	3.31	—0.09	5.87	1884	1.26	1883
Tennessee.									
Milan	Gibson	4.17	5	3.60	—0.57	7.25	1884	2.22	1886
Texas.									
New Ulm	Austin	4.62	15	4.97	+0.35	16.43	1875	0.44	1880
Vermont.									
Lunenburg	Essex	2.94	38	3.25	+0.31				
Newport	Orleans	2.99	13	3.80	+0.81				
Strafford	Orange	3.20	13	4.20	+1.00	5.90	1878	0.15	1875
Virginia.									
Bird's Nest	Northampton	3.70	19	5.95	+2.25	6.35	1872	1.70	1876
Dale Enterprise	Rockingham	2.05	7	3.14	+1.09	12.63	1885	0.96	1884
Variety Mills	Nelson	3.77	8	4.04	+0.27	6.29	1881	1.80	1880
Wytheville	Wythe	2.94	23	2.91	—0.03	6.00	1871	0.02	1861
West Virginia.									
Helvetia	Randolph	4.56	11	2.81	—1.75	8.81	1881	1.86	1876

HAIL.

Hail fell at scattering stations, mostly in the Northern States and territories, during the month on the following dates: 1st to 3d, 15th, 17th to 24th, 26th, 28th to 31st.

SLEET.

Sleet fell at scattering stations, mostly in the Northern States and territories, during the month on the following dates: 1st to 3d, 7th, 10th to 12th, 15th to 27th, 29th to 31st. It was most frequent on the 31st.

SNOW.

Snow fell on numerous dates during December in all districts north of the thirty-fifth parallel, except on the Pacific coast, where it was less frequent, and where none was reported to the south of the parallel mentioned. In Alabama snow fell on the 26th; in Mississippi on the 24th and 26th; in Louisiana on the 22d and 26th; in Texas on the 11th, 14th to 16th, 18th, 19th, and from the 22d to 25th.

The heavy snow storms of the 18–20th in New York and Pennsylvania, and those of the 29–30th in Illinois, Iowa, Dakota, Minnesota, Wisconsin, and Michigan, caused blockades on railroads in the states mentioned. The snow storms of the 15th and 24th in Texas were of unusual severity for that region, as will be shown by the following reports:

Colorado, Tex., 15th: snow is six inches deep in the streets, and it is very cold.

Denison, Tex., 15th: a light snow, the first of the season, fell at 8 p. m.

Baird, Tex., 15th: the first snow of the season fell here to-day. It has continued to come down all day to the depth of seven inches.

Sherman, Tex., 15th: the first snow in Texas for 1887 fell in this city at 6 p. m. to-day, and is still falling.

Murphysville, Tex., 15th: the heaviest snow storm that has visited this section of Texas for six years fell yesterday and to-day, covering the ground from six inches to a foot. The trains on the Southern Pacific Railroad were detained from one to five hours, and in many cases trains were compelled to double on account of snow drifts in cuts along the line. The storm extends from Del Rio as far west as El Paso and south across the Rio Grande into Mexico. No snow of any importance has fallen here in four years.

Fort Worth, Tex., 15th: a general snow storm, the heaviest in the memory of the oldest settlers, is reported throughout western Texas. At Cisco and San Angelo the snow is six inches deep; at Abilene four inches, and at Sweetwater four inches. It snowed here all the afternoon, but melted as fast as it fell. No loss of cattle is feared unless the snow is followed by a "blizzard."

Palestine, Tex., 23d: rain fell during the afternoon and froze as it fell, coating all exposed objects heavily with ice; at 1.30 a. m. of the 24th the rain changed to snow, which continued until 10.27 a. m. This storm was remarkable for the depth of snow, about nine inches having fallen. Much damage was done to telegraph lines and trees which were weighted with snow and ice.

Jefferson, Tex., 24th: it commenced snowing this morning at 2 o'clock and continued for several hours, covering the ground six inches deep. The weather has moderated considerably this afternoon and the snow is melting fast.

Tyler, Tex., 24th: the heaviest snow seen here for ten years fell last night and morning, amounting to from six to eight inches in depth. The weather cleared off at 10 o'clock and the snow is melting rapidly.

Austin, Tex., 23d: there was a light fall of snow here, lasting all day. The ground was covered this morning with frozen sleet about a quarter of an inch.

MONTHLY SNOWFALLS.

In northern portions of Minnesota and Michigan, in northeastern Iowa, and throughout Wisconsin the monthly snowfalls amounted to 20 inches or more; snowfalls of 20 inches or more also occurred in the northern and central portions of New Hampshire and Vermont, in northeastern New York, and in portions of central and eastern Pennsylvania. With the exception of the northern portions of Illinois, Indiana, and Ohio, and along the immediate coast of the Atlantic, the monthly snowfalls exceeded 10 inches over the whole area north of the fortieth parallel from Missouri Valley eastward.

The following monthly snowfalls of ten inches or more occurred; but in states having less, the maximum amount is also given:

Alabama: Livingston, 2. *Arizona:* Prescott, 7.1. *Arkansas:* Little Rock, 3. *California:* Fort Bidwell, 19.7. *Colorado:* Grand Junction, 6.6. *Connecticut:* North Colebrook, 16.9; Southington, 11. *Dakota:* Richardton, 19; Deadwood, 18.3; Yankton, 18.1; Huron, 15.5; Webster, 14.5. *District of Columbia:* Kendall Green, 6.2. *Idaho:* Boisé City, 2. *Illinois:* Rockford, 28.6; Prairieville, 21.5; Cedarville, 18.7; Lake Forest, 18.4; Oneida and Woodstock, 18; Aurora, 17.2; Riley, 16.5; Aledo, 16.2; Mount Morris and Monmouth, 16; Belvidere, 14; Sterling, 12.5; Oswego, 11.2; Chicago and Fairview, 10.7; Oquawka and Watseka, 10.0. *Indiana:* Angola, 15. *Iowa:* Dubuque, 32; Cresco and Muscatine, 21; Albia, 20.8; Independence, 17.8; Fort Madison, 15.5; Oskaloosa *a*, 13.5; Des Moines, 12.3; Cedar Rapids, 12.2; Oskaloosa *b*, 10. *Kansas:* Leavenworth, 7.6. *Louisiana:* Vidalia, 6. *Maine:* Kent's Hill, 18.2; Cornish, 15.5; Skowhegan, 12.4. *Maryland:* Fallston, 18. *Massachusetts:* Mount Nonotuck, 12.8; Deerfield, 12.5; Amherst *a*, 12.2; Fitchburg, 11.8; Amherst *b*, 10. *Michigan:* Alpena, 43.5; Calumet, 40.5; Central Mine and Snowflake, 37; Big Rapids and Gaylord, 34; Traverse City, 30; Harrisville, 29; Mackinaw City and West Branch, 28.2; Charlevoix, 27; Benzonia, 26.5; Fletcher, 27; Hart, 25; Escanaba, 23.3; Mio, 21.8; Hartford, 21; Greenville, 19.5; Marquette, 19.2; Williamston, 17.5; Grand Rapids, 17.4; Lansing, 17.3; Alma, 17.2; Cassopolis, 15; Hastings, 14.5; Hudson, 13.6; Kalamazoo, 12.5; Marshall, 10.8; Traverse City, 10. *Minnesota:* Minneapolis, 33.1; Moorhead, 20.2; Saint Paul, 16.5. *Mississippi:* Vicksburg, 5.4. *Missouri:* Springfield, 3. *Montana:* Fort Assinaboine, 7.5. *Nebraska:* Hay Springs, 16.5. *Nevada:* Carson City, 13.4. *New Hampshire:* Berlin Mills, 32; North Colebrook, 26; Walpole, 22.2; Plymouth, 19.5; Manchester, 16; Antrim, 15.2; Manchester, 14.7; Nashua, 13.2. *New Jersey:* Dover, 15.5; Beverly, 11.9. *New Mexico:* Fort Stanton, 12. *New York:* Utica, 35; Albany, 27.2; Menands, 21; Saratoga, 18.8; Auburn, 17; Oswego, 16.2; Humphrey, 16; Ardenia, 14.2; Penn Yan, 13.5; Boyd's Corners, Friendship, and White Plains, 13; Cooperstown, 12; Ithaca, 11.5; Factoryville, 11.1; Buffalo, 10.3; Palermo, 10. *Ohio:* Jefferson, 12.9; Pomeroy, 11; Hiram, 10. *Oregon:* Lakeview, 17.7; La Grande, 11.9. *Pennsylvania:* Blooming Grove, 31; Girardville, 27.5; Phillipsburg, 25.6; Easton, 25; Pottstown, 24.5; Quakertown, 22.2; Bethlehem and Dyberry, 22; Drifton, 20; Scranton, 18.2; Lancaster, 16.5; Wysox, 16; State College *a*, 14.6; Grampian Hills, 14.5; Meadville, 13.2; West Chester, 13; Erie, 12; State College *b*, 12.5; Westtown, 11; Wellsborough, 10.5; Catawissa, 10.3; Germantown, 10. *South Carolina:* Stateburg, trace. *Tennessee:* Knoxville, 3.2. *Texas:* Palestine, 9.2. *Utah Territory:* Salt Lake City, 23.7. *Vermont:* Northfield, 43.5; Jacksonville, 31.8; Strafford 31; Burlington, 30; Manchester, 27.5; Cornwall, 26; Brattleborough, 24.8; Chelsea, 23.2; Newport, 23. *Virginia:* Wythville, 7. *Washington Territory:* Spokane Falls, 11.9. *West Virginia:* Middlebrook, 12.5. *Wisconsin:* Green Bay, 35.4; Embarras, 33.8; Fond du Lac, 27; Deuster, 26.9; Manitowoc, 25; Milwaukee, 24.9; Lancaster and Prairie du Chien, 24; Delavan, 21.6; Beloit, 19.3; Franklin, 17; La Crosse, 14.6; Madison, 14. *Wyoming:* Camp Sheridan, 24.1.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[*Expressed in inches and tenths.*]

At the close of the month there were from 10 to 20 inches of snow on the ground in northern Michigan, Wisconsin, northern Iowa, Minnesota, and in the northern portions of New Hampshire and Vermont. In all districts east of the Rocky Mountains, north of the fortieth parallel, there remained on the ground at the close of the month snow to a depth generally in excess of 2 inches, the greatest depth, 36 inches, being reported from Newport Vt., and Embarras, Wis.

Arizona: Prescott, 0.3. *California:* Fort Bidwell, 9. *Colorado:* Grand Junction, 2.5. *Connecticut:* North Colebrook, 8; Southington, 2; Middletown, trace. *Dakota:* Huron, 15; Webster, 12; Richardton, 8; Fort Totten, 6.5; Yankton, 5.1; Fort Buford, 5; Bismarck, 4; Deadwood, 3; Fort Sully, 2. *District of Columbia:* Washington City, 2. *Idaho:* Boisé City, 0.4. *Illinois:* Jacksonville and Springfield, 2; Chicago, 1; Charleston, 0.1. *Indiana:* Logansport, 3.5; Indianapolis, 0.2; Sunman, trace. *Iowa:* Dubuque, 20; Cresco, 18; Independence 15; Muscatine and Webster City, 12; Cedar Rapids, 10; Albia and Oskalooso *a*, 9; Oskaloosa *b*, 8; Des Moines and Fort Madison, 4; Keokuk, 3. *Kansas:* East Norway, 2.5; Dodge City and Concordia, 1; Globe and Libo, drifts; Topeka, Wakefield, Wellington, and Yates Centre, trace. *Maine:* Cornish, 12.5; Skowhegan, 8; Orono, 2; Gardiner, 1.5; Eastport, 0.7. *Maryland:* Fallston, 4; Cumberland, 2; Baltimore, 1. *Massachusetts:* Deerfield, 6; Mount Nonotuck and Fitchburg, 5; Amherst, 4; Gilbertville, 3; Lowell, 2; Newburyport, 1; Blue Hill Observatory, trace. *Michigan:* Central Mine and Gaylord, 36; Charlevoix, 30; West Branch, 26; Traverse City and Fletcher, 24; Benzonia and Hillman, 18; Alpena and Big Rapids, 16; Snowflake and Mackinaw City, 15; Marquette, 14; Sault Saint Marie, 12; Mio, 11.5; Greenville, 11; Grand Rapids, 10; Grand Haven, 9.3; Hudson, 9; Buchanan, Alma, and Hartford, 8; Escanaba, Ovid, and Olivet, 7; Petersburg, Bad Axe, Kalamazoo, and Cassopolis, 6; Adrian, Mottville, Mount Morris, Thornville, and Hanover, 4; Lansing, Williamston, Hastings, and Jonesville, 3; Madison, Sand Beach, Port Huron, Lansing (State Capitol), Concord, and Coldwater, 2. *Minnesota:* Minneapolis, 20; Saint Paul and Duluth, 18; Moorhead, 11; Saint Vincent, 5. *Missouri:* Frankford, 1.5; Fayette, 1; Conception, 0.1. *Montana:* Fort Assinaboine, 6; Helena, 3; Poplar River, 2; Fort Maginnis, 1.1. *Nebraska:* Hay Springs, 10; Marquette, 5; University of Nebraska, De Soto, Omaha, and Valentine, 4; Brownville and Genoa, 3; Crete, North Platte, and Tecumseh, 2. *Nevada:* Carson City, 5; Winnemucca, 3.

New Hampshire: Walpole, 20; North Conway and Plymouth, 12; Manchester, 5; Nashua, 3. *New Jersey:* Dover, 5; Beverly and Egg Harbor City, 2; Vineland, 1.5; Moorestown, 1. *New Mexico:* Fort Stanton, 2.5. *New York:* Utica, 15.2; Menands, 15; Auburn, 13; Albany, 12; North Volney, 10; Cooperstown and Humphrey, 8; Ardenia and Palermo, 6; Factoryville, Oswego, and Penn Yan, 5; Buffalo, Friendship, and Ithaca, 4; Boyd's Corners, 3; Rochester, 2; New York, 1.3. *Ohio:* Sandusky, 5; Hiram and Wauseon, 4; Garrettsville and Tiffin, 3; Napoleon and Toledo, 2; Columbus, trace. *Oregon:* Lakeview, 7; La Grande, 5. *Pennsylvania:* Blooming Grove, 15; Drifton and Dyberry, 12; Quakertown, 9.5; Phillipsburg, 7; Erie, State College, and West Chester, 4; Corry, 3 to 4; Wellsborough, 3.1; Westtown, 3; Philadelphia, 2.6; Meadville, 2; Wilkesbarre, 1. *Utah:* Salt Lake City, 7.3; Frisco, 5. *Vermont:* Northfield, 36; Cornwall, 26; Burlington, Manchester, and Strafford, 20; Chelsea, 19; Jacksonville, 18; Newport, 15; Brattleborough, 14. *Virginia:* University of Virginia, 2.5; Variety Mills, 2; Lynchburg, 0.4; Wytheville, 0.2. *Washington Territory:* Spokane Falls, 4; Walla Walla, 1. *West Virginia:* Middlebrook, 4. *Wisconsin:* Embarras, 36; Green Bay, 26; Deuster, 24; Manitowoc, 18; Franklin and Lancaster, 16; Fond du Lac, 15; Milwaukee, 14; Delavan, 12.9; La Crosse, 12; Prairie du Chien 11; Beloit, 9.5. *Wyoming:* Camp Sheridan, 8.6; Fort Bridger, 0.5.

Excessive precipitation for the month of December, 1887.

States and stations.	Monthly, 6 inches, or more.	Specially heavy.					
		2 inches, or more, per day.			At rate of 1 inch, or more, per hour.		
		Am't.	Duration.	Date.	Am't.	Duration.	Date.
			h. m.			h. m.	
Alabama.							
Mount Willing	15.95						
Trinity	14.60	5.20		4			
Auburn	13.84	3.16		9			
Tuscaloosa	11.64	2.74		7			
Gadsden	11.10	2.95		9			
Talladega	10.48	2.10		7			
Mount Vernon	9.92	2.00		19, 20			
Do		2.00		23			
Livingston	9.65	3.14		7, 8			
Oswichee	8.58	2.00		31			
Carrollton	8.26	3.10		31			
Montgomery	8.25						
Newton	8.00						
Valley Head	7.88	3.00		31			
Union Springs	7.83	2.71		8			
Mobile	7.21						
Bermuda	6.74						
Florence	6.04	2.00		31			
Arkansas.							
Hot Springs	11.16	6.92	47 30	1-3			
Little Rock	7.14	2.31	12 30	3, 4			
British Columbia.							
New Westminster	11.40	2.50		11			
California.							
Fort Gaston	8.36						
Florida.							
Tallahassee	8.35	3.30		16			
Pensacola	6.89	2.02	19 30	23, 24			
Georgia.							
Quitman	9.55	3.90	20 15	16			
Savannah	7.99	3.37	17 00	24			
Forsyth	7.56	2.15	12 00	23, 24			
Andersonville	6.82						
Idaho.							
Sherman, Fort	6.66						
Indiana.							
Marengo	7.23	2.50		31			
Crawfordsville		2.00		31			
Seymour		2.00		31			
Louisiana.							
New Iberia	8.26						
Monroe	7.98						
Grand Coteau	7.80						
New Orleans	7.56	2.00		23, 24			
Liberty Hill	7.48						
Mandeville	7.33						
Shreveport	6.72	3.18	*22 50	6, 7			
Donaldson	6.62						
Delta	6.56						
Maine.							
Gardiner		2.24		10, 11			
Portland		2.01		11			
Maryland.							
Fallston	6.40						
New Midway	6.05						
Massachusetts.							
Deerfield		2.52	12 00	27			
Nantucket		2.20	†24 00	11, 12			

Excessive precipitation, etc.—Continued.

States and territories.	Monthly, 6 inches, or more.	Specially heavy.					
		2 inches, or more, per day.			At rate of 1 inch, or more, per hour.		
		Am't.	Duration.	Date.	Am't.	Duration.	Date.
Mississippi.			m. h.			h. m.	
Biloxi	10.13	2.26	8 00	13, 14			
Vicksburg	7.07						
Oxford	6.32						
New Jersey.							
Lambertville	7.32	2.10		17, 18			
Dover	6.78	2.04		18			
Newton	6.63	2.64		31			
Trenton	6.33						
Locktown	6.01						
Imlaystown	6.00						
Paterson		2.40		11, 12			
Tenafly		2.00		11, 12			
New York.							
Boyd's Corners	6.71						
White Plains	6.40						
North Carolina.							
Southport	7.78						
Hatteras	6.96	3.10	†24 00	10			
Chapel Hill	6.19	2.90		8, 9			
Ohio.							
West Milton	6.50						
New Bremen		2.00		31			
Oregon.							
Yaquima Light-house	17.91	8.47		5-6			
Do		2.66		25			
Astoria	16.64	3.17	24 00	6, 7			
Bandon	14.54	6.44		4-7			
Do		2.51		28			
Albany	14.21	4.98		5, 6			
Do		2.32		25, 26			
Portland	11.34	2.22	24 00	6			
East Portland	12.10						
Roseburg	8.89						
Pennsylvania.							
Germantown	7.15						
West Chester	6.81	2.01		10, 11			
Pottstown	6.50	2.00		18			
Westtown	6.41						
Quakertown	6.05						
Easton	6.01						
Blooming Grove		2.00		18			
Chambersburg		2.50		17			
South Carolina.							
Charleston	7.91	3.08	24 00	23, 24			
Hardeeville	6.22	3.54		24			
Tennessee.							
Fostoria	8.70	3.00		31			
Cookeville	8.38	2.97		31			
Lawrenceburg	7.45	3.88		31			
Savannah	6.45	2.58		31			
Nashville		2.24	7 00	31			
Riddleton		2.86		31			
Hohenwald		2.54		31			
Florence Station		2.96		31			
Ashwood		2.70		31			
Waynesborough		2.20		31			
Texas.							
Galveston	10.28	2.90	†24 00	23			
Palestine	6.72						
Rio Grande City		2.55	24 00	12			
Brownsville		2.07	†24 00	23			
Vermont.							
Manchester	6.09						
Northfield		2.14	24 00	28, 29			
Washington Territory.							
Neah Bay	22.57	2.83		4			
Do		2.00		6			
Do		2.20		11			
Do		5.45		16, 17			
Do		3.56		25, 26			
Tatoosh Island	17.47	2.24		16			
Do		2.43		25, 26			
Olympia	15.75	3.85	20 00	6, 7			
Fort Canby	15.18	2.17	24 00	24, 25			
Vashon	10.67	3.80		6, 7			
Do		2.00		11			
Tacoma	10.26	3.04		6, 7			
Blakely	7.89	2.50		6			
Port Angeles	6.09						

*Less than 22 h. 50 m. † Less than 24 hours.

HEAVY RAINFALLS AT NEW YORK CITY.

In connection with the subject of heavy rainfalls, Prof. Daniel Draper, Director of the Central Park Meteorological Observatory, New York City, at the request of the Chief Signal Officer, has kindly furnished the following table, compiled from the records of the self-registering rain-gauge of the Central Park Observatory.

The following record shows that in the nineteen years of observation rains have fallen at the rate of one inch, or more, per hour in sixty-six instances, thus giving an average of about three and one-half of such rainfalls per year. During this

period rainfalls at the rate of one inch, or more, per hour were most frequent in 1882, in which year seven instances are recorded, while the years 1869 and 1886 had but one each:

Table showing (1) rainfalls of one inch, or more, per hour, and also the fractional part of an inch of rain in a few minutes, which would be equivalent to more than one inch per hour; (2) the duration; (3) the rate of fall per hour; (4) the duration of, and amount of water for, each storm, in which these heavy rainfalls occurred.

Dates.	Actual rate.	Time.	Rate per hour.	For storm.	
	Inches.	*Min.*	*Inches.*	*H. M.*	*Inch.*
August 13, 1869	.50	10	3.00	1 05	.63
June 27, 1870	.50	15	2.00	1 45	.93
July 28, 1870	.45	10	2.70	3 15	1.01
June 7, 1871	.50	10	3.00	6 00	1.87
July 16, 1871	1.00	20	3.00	2 40	1.50
July 28, 1871	.50	10	3.00	7 30	.60
August 16, 1871	.50	10	3.00	5 05	.70
October 11, 1871	.50	10	3.00	3 50	1.58
October 27, 1871	.50	15	2.00	11 45	1.32
July 4, 1872	.50	25	1.20	6 45	1.20
July 15, 1872	.60	15	2.40	7 50	1.57
July 25, 1872	.50	20	1.50	8 30	2.91
August 10, 1872	.50	20	1.50	1 20	.54
October 25, 1872	.43	20	1.29	9 15	1.56
July 5, 1873	.65	10	3.90	4 20	.94
July 27, 1873	.50	05	6.00	19 00	1.36
August 21, 1873	1.00	60	1.00	13 00	4.15
August 30, 1873	.50	20	1.50	3 00	.77
August 31, 1873	.49	25	1.20	45	.50
July 10, 1874	.50	15	2.00	4 10	1.74
July 12, 1874	.80	30	1.60	1 00	.83
June 23, 1875	.45	20	1.35	3 30	.72
July 26, 1875	.69	15	2.76	6 00	1.87
August 12, 1875	.50	20	1.50	5 50	2.63
August 18, 1875	.90	30	1.80	9 00	1.91
August 17, 1876	1.00	20	3.00	8 20	2.06
June 21, 21, 1877	1.00	60	1.00	5 00	1.33
July 3, 1877	.40	05	4.80	3 00	.54
July 17, 1877	.50	05	6.00	5 00	2.91
October 4, 1877	1.50	60	1.50	19 30	4.05
June 22, 1878	.50	20	1.50	7 00	1.20
August 1, 1878	1.00	30	2.00	18 00	2.85
August 6, 1878	2.50	30	5.00	1 20	2.66
September 5, 1878	1.00	60	1.00	5 00	2.44
June 15, 1879	.50	30	1.00	1 00	.54
August 25, 1879	.50	20	1.50	11 00	1.00
July 11, 1880	.50	30	1.00	2 00	.56
July 13, 1880	1.00	15	4.00	6 00	1.35
July 27, 1880	.50	10	3.00	30	.51
August 21, 1880	.95	45	1.29	1 30	.97
August 25, 1880	1.00	60	1.00	2 45	1.17
May 22, 1881	1.15	10	6.90	50	1.21
July 4, 1881	.50	20	1.50	5 45	.80
June 15, 1882	.35	10	2.10	2 10	.36
June 19, 1882	.50	20	1.50	5 30	.80
June 26, 1882	.50	10	3.00	1 30	.56
September 11, 1882	1.08	60	1.08	22 50	2.57
September 21, 1882	.45	08	3.38	8 00	1.20
September 22, 1882	1.00	25	2.40	13 15	2.34
September 23, 1882	1.90	60	1.90	19 30	8.28
May 21, 1883	1.70	60	1.70	14 00	2.18
June 6, 1883	.44	05	5.28	45	.45
July 13, 1883	.75	15	3.00	1 20	.83
June 25, 1884	1.00	60	1.00	11 30	4.74
July 12, 1884	.40	10	2.40	10 30	1.60
August 5, 1884	.45	05	5.40	9 20	1.44
August 22, 1884	1.30	30	2.60	5 50	1.83
August 29, 1884	.90	30	1.80	16 15	1.06
June 5, 1885	.30	03	6.00	45	.38
August 3, 1885	.75	20	2.25	17 15	2.47
November 18, 1886	.25	02	7.50	6 00	.49
June 1, 1887	1.00	30	2.00	9 30	2.60
June 20, 1887	.50	20	1.50	3 30	.57
June 22, 1887	.50	15	2.00	7 30	1.66
August 18, 1887	.43	05	5.16	45	.44
August 22, 1887	.50	30	1.00	8 10	1.09

The table below shows the number of times rainfalls ranging from one inch to more than six inches per hour have occurred at Central Park in nineteen years, with the average rate per hour and the average duration:

Amount, in inches.	Number of occurrences.	Average rate per hour.	Average actual rate.	Average duration.
		Inches.	*Inch.*	*Minutes.*
1 to 2	29	1.35	0.78	36
2 to 3	14	2.25	0.68	18
3 to 4	12	3.11	0.62	12
4 to 5	2	4.40	0.70	10
5 to 6	4	5.21	0.86	11
6 or more	5	6.48	0.54	5

NOTE.—It will be understood from the preceding table that there were *not* twenty-nine cases in which there was an average hourly rainfall of 1.85 inches, but that there were twenty-nine cases in which rain fell at a rate which would have given that result had the rain continued for one hour. The average duration of these twenty-nine rains being thirty-six minutes, the average actual rainfall was 0.78 inch.

Actual rainfalls of one inch, or more, in one hour, or less, occurred eighteen times in the nineteen years, the amount of rain aggregating 22.13 inches for a total duration of twelve hours and thirty minutes. The average of these actual rainfalls was 1.23 inches for each forty-two minutes, or at a rate of about 1.80 inches per hour. It may therefore be stated that during the nineteen years there has been an average of one storm per year in which there was an actual fall of rain in excess of one inch for a shorter period than one hour.

Table showing for the month of December monthly rainfalls of 10 inches, or more; rainfalls of 2.50 inches, or more, in any 24 consecutive hours; and rainfalls equaling or exceeding one inch in one hour.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time	Amt.
Alabama.		*Inches*			*Inches*			*h. m.*	*Inches*
Mobile			1876	21	2.72	1879	5	0 35	1.00
Do			1885	13	4.18				
Mount Willing	1887	15.95							
Trinity	1887	14.60	1887	4	5.20				
Auburn	1887	13.84	1887	9	3.16				
Tuscaloosa	1887	11.64	1887	7	2.74				
Gadsden	1887	11.10	1887	9	2.95				
Talladega	1887	10.48							
Arkansas.									
Little Rock	1884	16.92							
California.									
Los Angeles			1878	31	3.58	1877	17	1 00	1.00
Do			1879	19-20	4.34	1884	25	1 00	1.00
Do			1884	25-26	3.04				
Red Bluff	1880	12.85	1881	4	2.89				
Sacramento	1880	11.81	1880	2	2.58				
Do	1884	10.45	1885	21	2.81				
Salinas			1872	24	3.20				
San Francisco			1871	18	2.83				
Do			1871	18-19	3.14				
Do			1871	19	8.12				
Do			1885	21	2.78				
San Diego			1873	4	2.52				
Do			1879	27-28	2.55				
Florida.									
Cedar Keys			1884	5	3.73				
Jacksonville			1885	9-10	4.43				
Key West			1870	20-21	3.00				
Do			1879	11-12	3.93				
Pensacola			1681	21	4.17				
Do			1885	13	4.23				
Georgia.									
Atlanta			1879	13-14	4.12				
Do			1884	14	3.74				
Savannah			1880	6	3.01				
Do			1885	9-10	3.66				
Do			1887	23-24	3.71				
Illinois.									
Cairo			1879	23-24	2.75	1871	31	1 00	1.25
Do			1887	27-28	2.65				
Louisville			1873	3	5.70				
Peoria			1856	9	2.62				
Springfield			1881	13	3.33				
Chicago			1871	22-23	2.50				
Indiana.									
Indianapolis			1873	3	3.46	1873	3	1 00	1.30
Do						1874	27	1 00	1.00
Iowa.									
Keokuk			1873	11	2.61				
Kentucky.									
Louisville			1873	3	3.87				
Do			1875	24	2.84				
Do			1878	23-24	2.70				
Louisiana.									
New Orleans			1872	18	2.54				
Do			1875	4	3.82				
Do			1877	31	2.59				
Do			1881	13-14	2.32				
Do			1885	12-13	3 40				
Shreveport	1884	15.55	1872	15	2.53	1884	11	1 00	2.00
Do			1875	21	4.66				
Do			1881	13	3.56				
Do			1884	27	2.83				
Do			1884	28	4.08				
Do			1884	29	3.78				
Maine.									
Portland			1877	25-26	3.76				
Do			1878	9-10	2.58				
Maryland.									
Baltimore			1878	10	2.85				
Massachusetts.									
Boston			1878	10	2.58				
Nantucket						1887	12	1 00	1.00
Michigan.									
Mackinaw City			1683	20-21	4.50				
Mississippi.									
Biloxi	1887	10.13							
Vicksburg	1872	10.33	1872	18-19	5.05				
Do	1884	13.52	1876	23-24	3.70				
Do			1882	19-20	3.78				
Do			1883	29-30	4.51				
Do			1884	29	4.07				

Table showing for the month of December, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
		Inches.			*Inches*			*h. m.*	*Inches*
Missouri.									
Saint Louis			1873	2–3	2.61				
New Hampshire.									
Mount Washington	1881	15.95							
New York.									
Buffalo			1878	22–23	2.53				
Oswego	1878	10.49	1878	10	2.63				
Do			1878	10–11	2.81				
Cooper Union			1874	20	5.00				
North Carolina.									
Charlotte			1879	13–14	2.52				
Hatteras	1877	13.38	1877	5	2.60	1877	29	1 15	1.13
Do	1878	10.20	1877	19	4.17				
Do			1877	26	3.72				
Do			1882	30	2.82				
Do			1886	5	2.65				
Do			1887	10	3.10				
Ohio.									
Kenton			1873	3–4	2.75				
Cincinnati			1873	12–13	2.75				
Do			1880	4–5	3.10				
Do			1883	23–24	2.60				
Oregon.									
Albany	1887	14.21							
Astoria	1875	19.49	1875	31	3.57				
Do	1886	16.86	1887	6–7	3.17				
Do	1887	16.64							
East Portland	1887	12.10							
Newport	1887	17.91							
Portland	1875	13.41	1875	30–31	3.13				
Do	1880	13.93							
Do	1882	20.14	1877	9–10	3.15				
Do	1886	11.52							
Do	1887	11.34	1881	12–13	7.66				
Roseburg			1879	4	2.86				
Do			1883	24–25	2.50				
Do			1884	16–17	2.53				
South Carolina.									
Charleston			1873	25	2.54				
Do			1885	9–10	3.46				
Do			1887	23–24	3.08				
Hacienda Saluda			1875	27–29	5.00				
Tennessee.									
Chattanooga			1879	10–11	3.10				
Do			1880	1	3.08				
Do			1881	21–22	3.08				

Table showing for the month of December, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
		Inches.			*Inches*			*h. m.*	*Inches*
Tennessee—Continued.									
Knoxville			1872	19–20	3.48	1873	4	0 45	1.10
Do						1875	26	0 30	1.03
Memphis			1884	29–30	3.09				
Texas.									
Clarksville	1874	10.25	1875	23	3.00				
Do			1876	28–29	8.50				
Galveston	1887	10.28	1875	21–22	4.63	1871	28	0 20	1.36
Do			1878	19–20	4.74	1885	12	1 15	1.02
Do			1882	18–19	2.72				
Do			1884	28	4.50				
Do			1887	23–24	2.90				
Gilmer			1875	20–21	3.17				
New Ulm	1875	16.40	1875	3	5.62				
Do			1875	21	3.12				
Do			1875	24	2.63				
Do			1875	31	2.75				
Virginia.									
Lynchburg	1884	11.81	1879	13	3.17				
Do			1883	22	4.50				
Do			1884	21	6.74				
Norfolk			1872	25–26	2.85				
Washington.									
Canby, Fort	1885	10.56	1884	18	2.77				
Do	1886	17.35	1886	30–31	2.58				
Do	1887	15.18							
Neah Bay	1883	11.83							
Do	1885	13.00							
Do	1886	30.70							
Olympia	1877	11.73	1878	1	3.60				
Do	1879	11.42	1879	30–31	3.31				
Do	1880	16.66	1884	18–19	3.32				
Do	1882	10.32	1886	30–31	2.50				
Do	1886	13.38	1887	6–7	3.82				
Do	1887	15.75							
Pysht	1883	11.34							
Do	1886	21.61							
Tacoma	1887	10.26							
Tatoosh Island	1883	10.45	1884	19–20	2.68				
Do	1884	12.47	1884	20–21	2.85				
Do	1885	10.14	1886	2–3	2.95				
Do	1886	25.84	1886	11–12	4.02				
Do	1887	17.47	1886	12–13	2.90				
British Columbia.									
New Westminster	1887	11.40							

WINDS.

The most frequent directions of the wind during December, 1887, are shown on chart ii, by arrows flying with the wind. They were from north or northwest in the Missouri Valley, New England, the middle Atlantic, and west Gulf states; from west or southwest in the Lake region and northern slope; from north, northeast, or east in the south Atlantic and east Gulf states, and in other districts variable.

HIGH WINDS (in miles per hour).

The maximum velocities of wind for December, 1887, at Signal Service stations where the movements are registered, are given in the table of miscellaneous meteorological data. Other than the maximum velocities given in this table, the following have been reported: Mackinaw City, Mich., 59, e., 3d. Block Island, R. I., 55, n., 3d; 58, nw., 28th. Fort Canby, Wash., 66, se., and 72, s., 4th; 72, s., 6th; 52, s., 8th; 64, s., 9th; 72, s., 11th; 56, sw., 26th. Fort Maginnis, Mont., 32, nw., 7th.

LOCAL STORMS.

With the exception of the storm which occurred in the vicinity of Los Angeles, Cal., during the 13–14th, and that which occurred in the Indian Territory on the 18th, no well-defined local storms are reported to have occurred during December. The following are, for the most part, reports of storms which occurred in connection with some of the more important areas of low pressure, the paths of the centres of which are traced on chart i:

Fort Sully, Dak.: light and heavy snow fell alternately during the night of the 2–3d and continued throughout the following day, with high westerly winds, which reached a maximum velocity of forty-three miles per hour. A similar storm occurred on the 31st, reaching a velocity of thirty-six miles per hour; this was the worst storm of the season, and caused the delay of trains from twenty to twenty-four hours.

Los Angeles, Cal.: a severe storm set in from the north and east at 4 a. m. on the 13th, and continued until 9.45 a. m. on the following day; the most violent part of the storm occurred between 6.30 and 9.45 a. m. on the 14th, during which time the wind blew at an average rate of thirty-six miles, the maximum velocity being fifty miles per hour. The damage in this city was slight, but reports from the surrounding country state that the storm was very destructive, especially along the line of the Sierra Madre foot-hills, where many buildings were demolished and orchards in many places were badly injured. At Crescenta Canada, a small town twelve miles north of this place, a hotel was destroyed, resulting in the death of two persons.

The "Los Angeles Herald" of the 15th contained the following in connection with the storm above referred to:

At Glendora, several cottages were blown down; no one injured. At Paquima, in the San Fernando Valley, the new hotel was almost demolished; loss $5,000. At Lordsburg, the hotel recently erected was torn to pieces; loss $10,000. At Rialto, three houses destroyed. At Pasadena, several houses blown down on exposed points, and quite a number of persons injured. At Cucamonga, the depot almost totally destroyed; also the new hotel and several stores and buildings; loss about $50,000. At San Bernardino, several cottages wrecked. At San Fernando the roof of the brick warehouse was blown off and deposited on the middle of the Southern Pacific track. Between Cucamonga and Colton the cab was blown off the engine of a special eastbound freight train. At Colton the channel of the water ditch was so filled with sand which had drifted before the wind that it was impossible to obtain any water. At Riverside much damage was done in exposed districts.